WHAT IS CLAIMED IS:

1. A detection apparatus comprising:

means for generating an RF composite pulse, wherein said RF composite pulse consists essentially of two or more sub-pulses of different phase;

means for applying the RF composite pulse to a test sample;

means for detecting a nuclear resonance return signal in response to the application of the RF composite pulse to the test sample, wherein the detected nuclear resonance return signal includes a true signal component and a ringing signal component; and

processing means for processing the detected nuclear resonance return signal to identify the true signal component;

wherein the phases of each of the sub-pulses of the composite pulse, a phase of the true signal component and a phase of the ringing signal component are different.

2. A detection apparatus as claimed in claim 1, wherein the phase of the first sub-pulse is 0 and the phase of the second sub-pulse with respect to the first sub-pulse is x, such that the composite pulse is designated as (0, x).

3. A detection apparatus as claimed in claim 2, wherein x = 45°.

4. A detection apparatus as claimed in claim 1, wherein the means for generating an RF composite pulse generates a sequence of composite pulses.

5. A detection apparatus as claimed in claim 4, wherein the sequence of composite pulses includes (0, x), (0, -x+180), (0, x-180), (0, -x).

6. A detection apparatus as claimed in claim 5, wherein the processing means sums detected nuclear resonance return signals corresponding to each of the composite pulses with

weighting factors -1, +1, -1 and +1, respectively.

7. A detection apparatus as claimed in claim 1, wherein the true signal component is a nuclear quadrupole resonance signal.

8. A method comprising:

generating an RF composite pulse, wherein said RF composite pulse consists essentially of two or more sub-pulses of different phase;

applying the RF composite pulse to a test sample;

detecting a nuclear resonance return signal in response to the application of the RF composite pulse to the test sample, wherein the detected nuclear resonance return signal includes a true signal component and a ringing signal component; and

processing the detected nuclear resonance return signal to identify the true signal component;

wherein the phases of each of the sub-pulses of the composite pulse, a phase of the true signal component and a phase of the ringing signal component are different.

9. A method as claimed in claim 8, wherein the phase of the first sub-pulse is 0 and the phase of the second sub-pulse with respect to the first sub-pulse is x, such that the composite pulse is designated as (0, x).

10. A method as claimed in claim 9, wherein x = 45°.

11. A method as claimed in claim 8, wherein generating an RF composite pulse includes generating a sequence of composite pulses.

12. A method as claimed in claim 11, wherein the sequence of composite pulses includes (0, x), (0, -x+180), (0, x-180), (0, -x).

13. A method as claimed in claim 12, wherein processing includes summing detected nuclear resonance return signals corresponding to each of the composite pulses with weighting factors -1, +1, -1 and +1, respectively.

14. A method as claimed in claim 8, wherein the true signal component is a nuclear quadrupole resonance signal.

15. A detection apparatus comprising:

a radio frequency source;

a pulse generator mechanism coupled to the radio frequency source, wherein the pulse generator mechanism generates a radio frequency composite pulse consisting essentially of two or more sub-pulses of different phase;

a coil coupled to receive the radio frequency composite pulse from the pulse generator mechanism;

a detector coupled to the coil, wherein the detector detects a nuclear resonance signal received from the coil that includes a true signal component and a ringing signal component; and

a processor coupled to the detector, wherein the processor identifies the true signal component within the nuclear resonance signal;

wherein the phases of each of the sub-pulses of the composite pulse, a phase of the true signal component and a phase of the ringing signal component are different.

16. A detection apparatus as claimed in claim 15, wherein the phase of the first sub-pulse is 0 and the phase of the second sub-pulse with respect to the first sub-pulse is x, such that the composite pulse is designated as (0, x).

17. A detection apparatus as claimed in claim 16, wherein x = 45°.

18. A detection apparatus as claimed in claim 15, wherein the pulse generator

mechanism generates a sequence of composite pulses.

19. A detection apparatus as claimed in claim 18, wherein the sequence of composite pulses includes (0, x), (0, -x+180), (0, x-180), (0, -x).

20. A detection apparatus as claimed in claim 19, wherein the processor sums detected nuclear resonance return signals corresponding to each of the composite pulses with weighting factors -1, +1, -1 and +1, respectively.

21. A detection apparatus as claimed in claim 15 wherein the true signal component is a nuclear quadrupole resonance signal.

22. A detection apparatus as claimed in claim 15, wherein the pulse generator mechanism includes a pulse programmer and radio frequency gate and a radio frequency power amplifier.

23. A detection apparatus as claimed in claim 15, wherein the pulse generator mechanism is coupled to the coil via a coupling network, and wherein the detector is coupled to the coil via the coupling network.

24. A detection apparatus as claimed in claim 15, further comprising an alarm mechanism, wherein the alarm mechanism is activated by the processor with the true signal component exceeds a threshold value.